

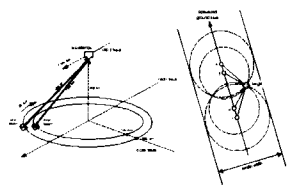
QuikSCAT Geophysical Model Function and Winds for Tropical cyclones

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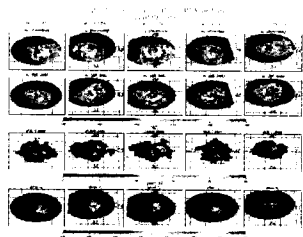


• QuikSCAT Observations

- QuikSCAT data suggest the sensitivity of Ku-band σ_0 s to ocean wind speed and direction for extreme high wind conditions (>30 m/s)
- There is about 0.5-1 dB wind direction dependence in σ_0 s at 30-50 m/s.

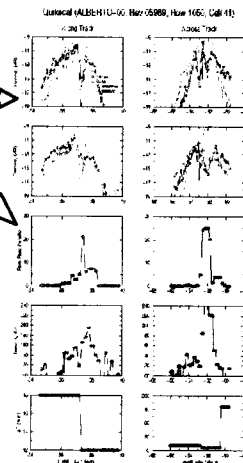


The Seawinds scatterometer on the QuikSCAT spacecraft uses a conical scanning antenna with two antenna beams to sample a wind vector cell from up to four different azimuth directions.



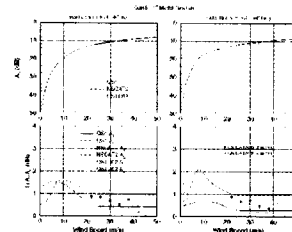
Images of QuikSCAT inner beam σ_0 s, SSM/I rain rate and QuikSCAT brightness temperature illustrate the evolution of Hurricane Alberto in 2000.

Distinct fore and aft σ_0 s in the regions of light rain, indicated by the SSM/I rain rate and QuikSCAT brightness temperature, suggest the effects of wind direction on σ_0 s for extreme high winds.

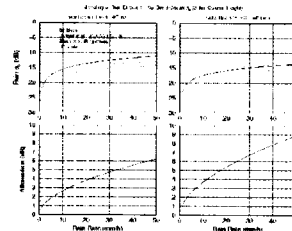


• QuikSCAT Geophysical Model Function

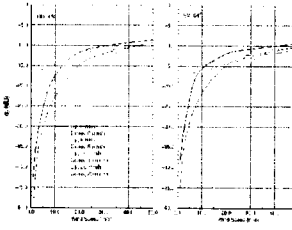
- The geophysical model function for hurricane force winds is revised using QuikSCAT data.
- Rain effects are modeled by two radiative transfer models.



QuikSCAT A_0 , A_1 , and A_2 model coefficients versus wind speed. QSCAT1 GMF coefficients are labeled by QSCAT1, NSCAT2 GMF by NSCAT2, revised QSCAT GMF by QSTC02.

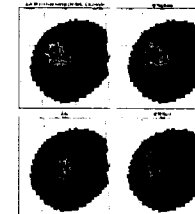


Radiative transfer models for rain by Stiles and Yueh (SY) [IEEE TGRS, in press], Haddad et al. for volume scattering and rain attenuation [IEEE TGRS, 1997], Bliven et al. for ring waves induced by raindrops [JRS, 1997], and combined Haddad and Bliven's model (HB).

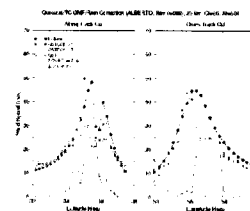
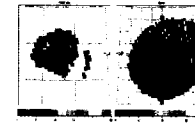


QuikSCAT geophysical model function with the effects of rain modeled by the HB and SY radiative transfer models indicate the relative significance of wind and rain on Ku-band radar backscatter. Relatively light rain (<10mm/h) conditions do not have significant impact on the sensitivity of σ_0 s to wind speed and direction for >20 m/s wind speed.

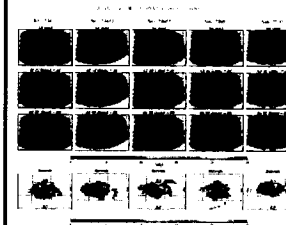
- Wind retrievals comparisons suggest the applications of QuikSCAT data for observations of tropical cyclones for relatively light rain conditions (<15 mm/h)
- The change of maximum wind speed estimates from QuikSCAT appears to track the changes indicated in the best track analysis.



QuikSCAT winds for Hurricane Alberto from rev 5982. The upper left panel plots the wind field of the selected direction ambiguity from the JPL ground data processing system using the QSCAT1 GMF and upper right panel the closest ambiguity field. The NCEP wind is in the middle left panel. The wind field from the retrievals using SY-model is in the middle right panel. The bottom panels are the SSM/I rain rate and time difference from the QuikSCAT observations.



The QuikSCAT wind speed profiles of Hurricane Alberto (rev 5982) along and across tracks through the center of cyclone, retrieved from the QSTC02-SY and QSTC02-HB models, show reasonable agreement with the best track analysis and Holland's model field.



The QuikSCAT estimates of maximum wind speeds indicate the change of hurricane intensity.

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- QuikSCAT σ_0 s sensitive to ocean wind for extreme high wind conditions
- Wind retrievals track intensity changes of tropical cyclones for relatively light rain conditions (<15 mm/h)

QUIKSCAT WIND FOR ALBERTO-00

